lington, Iowa, 22d, the last boat of the season passed this port to-day. Dubuque, Iowa, 21st, the last boat of the season departed for Saint Louis to-day; navigation closed. Keokuk, Iowa, 29th and 30th, floating ice in river. Davenport, Iowa, 22d, navigation closed for the season; the last boat passed downward on this date. The river is open and free from ice.

Tuscarawas river: Canal Dover, Ohio, 25th, ice in river reaching only a few feet from the shore. 30th, canal and river frozen over.

Lake Superior: Duluth, Minnesota, 21st, bay frozen over on the south side; tugs have difficulty in forcing passage; 30th, the steam barge "Oceola" from Detroit, whose arrival is daily expected, will be the last boat of the season. The barge "Davidson," which left this port on the 27th, was the last departure. A few tugs are still running, but navigation is practically closed for the season.

Big Horn river: Fort Custer, Montana, 12th, river frozen over.

Devil's Lake: Fort Totten, Dakota, 12th, lake partly frozen over; 23d, lake entirely frozen over.

Dakota river: Morriston, Dakota, 10th, river frozen over. Wicklow, Dakota, 25th, ice on lake from five to six inches thick.

Rock river: Rockford, Illinois, 27th, floating ice in river.

Eel river: Loagansport, Indiana, 25th, river partly frozen over.

Des Moines river: Humboldt, Iowa, 24th, river frozen over.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors, at the Signal Service stations, and the average depth at which the observations were taken, are given in the table on the right-hand of chart ii. In the first column of the table, is given, the maximum temperature observed during the month; and in the second column, the minimum temperature observed during the same period.

The table below shows the highest and lowest temperatures of water at the several stations; the range of water temperature; the mean temperature of the air at the station; and the depth of water at which the observations were taken:

Temperature of Water for November, 1882.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.		Mean temperature of the air at station.
	Max.	Min.		ft.	in.	
	°	°	°			°
Atlantic City, New Jersey	58.6	45.0	13.6	6	11	42.3
Alpena, Michigan	45.7	30.7	15.0	11	0	35.4
Augusta, Georgia	69.0	45.0	24.0	6	8	52.8
Baltimore, Maryland	61.0	44.0	17.0	9	9	44.3
Block Island, Rhode Island	57.5	41.2	16.3	8	6	42.7
Boston, Massachusetts	53.6	37.5	16.1	25	0	37.9
Buffalo, New York	55.0	39.0	16.0	8	0	37.7
Burlington, Vermont	54.0	44.2	9.8	17	0	35.8
Cedar Keys, Florida	76.0	49.0	27.0	8	8	61.7
Charleston, South Carolina	70.9	51.6	19.3	40	2	55.4
Chicago, Illinois	53.5	34.8	18.7	8	2	41.7
Chincoteague, Virginia	66.0	40.0	26.0	6	5	45.5
Cleveland, Ohio	56.3	40.1	16.2	14	0	40.2
Delaware Breakwater, Delaware	61.7	43.5	18.2	7	8	46.5
Detroit, Michigan	52.0	36.0	17.0	23	10	43.0
*Duluth, Minnesota	50.0	37.0	13.0	16	0	34.3
Eastport, Maine	49.1	45.1	4.0	17	0	35.7
Escanaba, Michigan	51.4	37.0	14.4	15	0	35.4
Galveston, Texas	77.0	52.0	25.0	14	10	64.1
Grand Haven, Michigan	46.5	31.0	15.5	19	0	40.4
Indianola, Texas	80.5	52.5	28.0	9	6	64.3
Jacksonville, Florida	73.0	60.0	13.0	18	0	60.0
Key West, Florida	81.3	70.0	11.3	14	1	72.9
Mackinac City, Michigan	50.0	37.5	12.5	13	0	37.3
Marquette, Michigan	44.9	35.9	9.0	10	6	35.4
Milwaukee, Wisconsin	49.5	34.6	14.9	8	0	39.8
Mobile, Alabama	73.5	55.0	18.5	14	8	58.5
New Haven, Connecticut	56.7	38.3	18.4	15	3	37.8
New London, Connecticut	61.0	42.0	19.0	12	4	40.0
Newport, Rhode Island	57.7	41.7	16.0	11	3	40.7
New York City	58.5	38.5	20.0	17	2	41.7
Norfolk, Virginia	62.0	45.0	17.0	17	6	49.1
Pensacola, Florida	76.1	56.1	20.0	17	8	59.0
Portland, Maine	50.0	38.5	11.5	19	2	39.6
Portland, Oregon	46.8	39.9	6.9	53	9	43.6
Port Eads, Louisiana	73.0	57.6	15.4	9	2	65.2
Provincetown, Massachusetts	54.0	41.0	13.0	14	0	41.6
Punta Rassa, Florida	79.6	64.6	15.0	11	8	67.1
Sandusky, Ohio	54.6	32.2	22.4	10	0	41.8
Sandy Hook, New Jersey	58.7	47.6	11.1	1	9	43.0
San Francisco, California	55.5	51.8	3.7	32	0	52.5
Savannah, Georgia	67.9	47.6	20.3	13	2	56.3
Smithville, North Carolina	69.0	50.0	19.0	10	0	51.0
Toledo, Ohio	54.5	33.9	20.6	10	7	42.0
Wilmington, North Carolina	63.5	49.0	14.5	13	0	52.2

*Observations not taken from 6th to 11th inclusive.

The largest monthly ranges are: 28° at Indianola, Texas; 27° at Cedar Keys, Florida; 26° at Chincoteague, Virginia; 25° at Galveston, Texas; 24° at Augusta, Georgia; 22° at Sandusky, Ohio; 20°.6 at Toledo, Ohio; 20°.3 at Savannah, Georgia; 20° at New York City and Pensacola, Florida. The smallest are: 3°.7 at San Francisco, California, 4° at Eastport, Maine; 6°.9 at Portland, Oregon; 9° at Marquette, Michigan; and 9°.8 at Burlington, Vermont.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroral displays were unusually frequent during the month. From the 16th to the 20th, the displays were very brilliant, and were accompanied by the most remarkable electrical disturbances that have been known for many years. Its effects upon the telegraph lines were generally felt throughout the United States. Long circuits were operated without the aid of batteries, and telegraphic and telephonic communication were seriously interrupted during its continuance. This auroral display and magnetic storm was observed and its influence felt throughout the British Isles, in British America, and in nearly all parts of the United States.

The following extract relating to this display is taken from "Nature" (a scientific journal published in London), of November 23, 1882:

"The telegraphic system of this country, has, since Friday morning last, been disturbed in a way that far exceeds anything of the kind that has ever happened before. Very powerful electric currents have been swaying backwards and forward through the crust of the earth, taking all telegraphic curcuits in the progress, and entirely stopping communication. Communication has been maintained only, where it was possible to loop together two wires, so as to avoid the use of the earth altogether. The electric storm commenced on Thursday, but it reached its climax on Friday morning (November, 17th), between 10.00 and 11.00 a. m. The currents measured over fifty milliampères, which is five times greater than the ordinary working currents. They have repeated themselves at intervals ever since, but have scarcely attained such an intensity as on Friday morning.

"Mr. Preece, whose experience in examining earth currents now extends over a period of thirty years, asserts that this storm was the most terrific he has ever observed. It was characterized on Friday by a rapid succession of alternate waves of great strength."

* * * * * * *

The following communication by Mr. W. H. M. Christie, of the Royal Observatory, Greenwich, of date November 20th, 1882, is also taken from "Nature":

"A remarkable magnetic storm, preceded by several days of considerable magnetic disturbance, was observed here on November 17th. It commenced suddenly—November 16, 22 h. 15 m. Greenwich mean time—with a great decrease in all the magnetic elements, the declination being diminished by more than 1°, the longitudinal force by more than 1-100th part, and the vertical force by nearly 1-100th part. From 4 h. to 7 h., and also from 11 h. to 17 h., the motions were large and violent, the range exceeding 2° for the declination and 1-50th part for the horizontal and vertical force. Earth-current disturbances were also recorded, corresponding both in time and magnitude with the magnetic changes.

"In the evening, as soon as it was dark, a brilliant aurora was seen, commencing with a bright glow of red light extending from the north and west beyond the zenith, interspersed with pale green phosphorescent light and streamers. At 6 h. 4 m. a very brilliant streak of greenish light about 20° long appeared in the east-northeast, and, rising slowly, passed nearly along a parallel of declination, a little above the moon, disappearing at 6 h. 5 m. 59 s. in the west, about two minutes after it was first seen. The whole aurora had faded away by about 7 h., but it burst out again at 11 h. 45 m., when an auroral arch, with brilliant streamers reaching nearly to the zenith, was seen from north-northeast to northwest. It faded away about 12 h. 10. m.

"A remarkable sun spot, visible to the naked eye, was seen on the sun on November 17th and following days, photographs being obtained on November 18th, 19th, and 20th. Its dimensions on November 18th, when it was near the central meridian, were: Length, 194″; breadth, 130″; area of umbra, 735; of whole spot, 2470 (expressed in millionths of the sun's visible surface), and its position. Heliographic latitude, 19° N.; longitude, 121°. Its spectrum showed C, F, D3, and the D lines reversed over the principle nucleus, C and F being extremely bright, and D1, D2, D3 doubly reversed. It slightly diminished in size on the two following days. This is the largest spot that has yet been photographed at Greenwich.

"Another very active magnetic disturbance commenced on November 19th, soon after midnight, and at noon to-day (November 20th) it is still in progress, all the elements being greatly disturbed."

Professor Charles Carpmael, Superintendent of the Meteorological Service of the Dominion of Canada, in the "Canadian Weather Review," for November, 1882, reports as follows:

"The number of auroras, as in the previous month, seems to have attained a much larger proportion than is usual for November, eight having been recorded at Toronto. This number has only been equalled once in thirty years (1860). The same fact appears to hold good throughout Canada. Some of these were very brilliant, especially that on the 17th, which appears to have been observed all over Canada, where the night was favorable."

Some of the most interesting reports that have been received concerning this phenomenon in the United States, are given below. Cloudiness, which prevailed to a large extent, interfered in great measure with the observations of the aurora.

Eastport, Maine: 16th, a faint straw-colored auroral light was observed between 7.00 and 11.00 p. m. 17th, auroral light observed from 7.00 p. m. to the early morning of the 18th. During the afternoon, the hard rubber in the lightning-arrester was burned out. Waves of whitish light shot upward from all parts of the horizon to the zenith. 18th, auroral light, similar to that observed on the night of 17th-18th, was visible from 7.00 p. m. to midnight; it consisted of waves of whitish light, shooting up from all quarters to the zenith.

Boston, Massachusetts: 17th, one of the severest electric storms ever experienced at this place began during the early morning and continued until late in the evening. Telegraphic communication between Boston and New York City was entirely suspended for more than three hours. 19th, a very brilliant aurora was observed from 10.40 p. m. till daybreak of the 20th. The light covered 80° of the northern horizon, and rose to an altitude of 90°, with streamers reaching entirely across the sky. 20th, aurora was visible from 7.15 to 8.00 p. m.; it was formed of slender luminous beams, extending from north to northeast, and to an altitude of 20°.

New Haven, Connecticut: 17th, at 5.36 a. m., nearly one hundred annunciators at the telephone office dropped instantaneously. This was repeated at irregular intervals throughout the day and night. The telegraph wires worked badly, showing the existence of an electric storm. The falling snow and clouds prevented any auroral observations. 18th, the snow storm continued until 2.00 a. m. At 3.00 a. m., when the clouds cleared away, a brilliant auroral display was visible in the northern sky. Columns of light of a yellowish grey color, shot upward, like rockets, to the north star. These were alternated with wave-like pulsations of the entire mass. The display continued until daybreak. At 6.30 p. m., delicate auroral streamers of brilliant green color shot upward from the horizon in the north-northwestern sky, to an altitude of 40°. They remained steady for a few minutes and disappeared temporarily, reappearing again to the east of north. These soon disappeared, leaving a dim slaty glow along the northern horizon. At 7.00 p. m., the auroral light gradually merged into the moonlight; 19th. A dim auroral light appeared in the north at 8.00 p. m., and a double arch formed at 8.45 p. m. This rose slowly and formed into a brilliant single arch, 20° in height, with a segment beneath of inky blackness. The band and dark segment merged into a dim radiance at 10.30 p. m. At 11.00 p. m., an arch, 25° in height, formed and immediately streamers shot upward nearly to the zenith; at this time, there was no dark segment. At 11.15 p. m., the whole northern sky, from east to west, was a mass of quivering filaments of steel-colored light. At the zenith a heavy mass appeared for a short time, while blood-red patches constantly shifted from one part of the sky to the other. At midnight the arch resembled the bottom of a silvery curtain hanging in folds. The display continued until daylight of the 20th.

New York City: 17th, no aurora was observed, but a remarkable electrical storm began at 5.00 a. m., and increased in intensity until 9.00 a. m., when the transmission of signals over telegraph wires having earth currents, became impossible. Metallic circuits worked perfectly, and by this means business was transacted to some extent over isolated lines. The disturbance continued until 1.50 p. m., when the working of the wires was resumed. The telegraph officials pronounce this disturbance to have continued longer and to have been severer than any other ever experienced here. At the office of the Direct Cable Company, messages could not be transmitted except when relieved of the ground wires, and placed in metallic circuit. There was the same trouble at the offices of the Mexican and Cuban cables.

Washington, District of Columbia: 18th, a faint auroral light was visible in the northern sky from 1.20 a. m. till daybreak. 19th, faint auroral light in northern sky at 10.30 p. m., reaching an altitude of 15°. The display continued until 12.30 a. m. of the 20th, when the sky became obscured by clouds.

Albany, New York: 16th, the effects of the magnetic storm was first felt here at 8.00 p. m., and gradually increased until noon of the 17th, when telegraphic communication south and west was wholly suspended. The current seemed to be strongest from the east, the wires connecting with Boston, being the first to become unserviceable. The switch-board was several times ignited. The wire from Albany to Utica was worked without battery. The telegraph companies were compelled to use metallic circuits; and nearly all business was transacted during the afternoon of the 17th by this means. 19th, at 9.00 p. m., an aurora was observed, extending from 90° to 270° azimuth, and to the zenith. Beams of bright light were continually shooting upwards from the horizon, changing in color from red to yellow. At 11.00 p. m., a perfect corona was formed, with its centre about 5° south of the zenith; it lasted until 11.50 p. m. Immediately after the corona disappeared an arch formed with an altitude of 60°, along this, "merry dancers" travelled with great rapidity. Soon after this the arch broke up, but the display continued in the form of a curtain of yellow light, until 12.10 a. m., when it again assumed the form of an arch. The display ended at 12.30 a. m. of the 20th.

Chicago, Illinois: 17th, a remarkable intensity of atmospheric electricity was reported by the various telegraph companies in this city. The switch-boards were burned and wires were worked with detached batteries. Evidences of an auroral display were observed at intervals during the evening, through occasional openings in the clouds.

Buffalo, New York: 17th, the clouds began to break away at 9.00 p. m., when an aurora was observed. Later, it became one of the most brilliant displays ever witnessed at this station. At 10.30 p. m., it had become clear, and the aurora was visible in all parts of the sky. Great beams of bright whitish light, resembling cirrus clouds, extended from all points along the horizon, and converged towards "Ursa Minor," forming a crown of white light around the constellation. The display continued with great brilliancy until 3.00 a. m. of the 18th, when a few beams only were visible in the north, there extended to an altitude of 40°. The appearance of this aurora was anticipated from the difficulty experienced on the telegraph lines during the preceding day. During the entire day and night the wires were worked only with the greatest difficulty.

Saint Paul, Minnesota: 17th, all of the telegraph lines running from this point eastward and over the northwest were much deranged, and worked badly from early morning to midnight. At 5.00 p. m., a dark, slate-colored segment was observed along the northern horizon, extending from 165° to 210° azimuth, and to an altitude of 20°. At 5.25 p. m., numerous beams shot upward from the segment toward the zenith, ranging in altitude from 45° to 75°. These beams, as well as the space over which they spread, varied from pale straw-color to a rosy hue, with occasional patches of deep red. At their first appearance, the beams did not extend over more than 40° of the northern horizon, but they advanced quickly, both east and west, and at 5.50 p. m., the whole northern heavens were covered with diffuse light, and with beams varying from straw-color to a rosy hue. The display continued without any marked change until 8.00 p. m., when the aurora showed great activity; and at 8.03 p. m., the whole sky, with the exception of a clear segment from 25° to 55° azimuth and of 15° altitude, was covered with beams and with auroral features of infinite varieties, colors varying from light slate to a deep red. At this time a complete corona was formed at a point 5° south and 10° east of the zenith. At 8.20 p. m., the luminous arches, on which the crown rested, and the corona began to fade, and at 8.23 p. m., only a faint trace of the aurora could be seen on the northern horizon. From 8.30 to 10.20 p. m., there was a hazy appearance in the north, varying from light to dense, and the remainder of the sky was perfectly clear, all traces of the aurora having disappeared. At 10.35 p. m., it again appeared, resembling the former display in all respects, except that the corona was, at this time, formed about 5° north of the zenith. At 10.45 p. m., the display disappeared, leaving the dark segment with faint traces of the auroral light until 11.30 p. m., when clouds formed. The aurora was reported to have been observed again in the form of luminous beams and pale diffuse light along the northern horizon until 2.30 a. m. of the 18th. On the 19th, at 6.25 p. m., a diffuse glare, emanating from a hazy segment, was observed in the north. At 6.40 p. m., numerous beams and rectangular-shaped belts, from 0° 30′ to 2° in width, shot upward toward the zenith to an altitude of 20° to 30°. The display continued until 11.40 p. m., when it became obscured.

Portland, Oregon: 17th, a brilliant auroral display was observed during the early morning. When first seen, at 3.50 a. m., it resembled the morning dawn. A few minutes later, a dark bank of a slatish color appeared; this formed a segment of a circle about 10° above the horizon and extending across the northern sky from east to northwest. Above this dark bank appeared an arc of delicate green, gradually fading to a bright white at the upper edge. This arc soon changed its color to a pale yellow or straw, and beautiful streamers of pale green at the base, changing to light pink at the centre, and to bright pink at the upper ends, shot from it. These constantly moved upward and downward and from side to side, rapidly changing in color. The dark base remained almost stationary, having only a slight motion from northwest to east, while rays of light shot upward from it to a height of 90° or more. The surrounding sky exhibited a great variety of tints. These colors varied in position and intensity. The display ended during the early morning of the 19th. The observer at Portland reports that this display was far more brilliant than any ever witnessed by him while he was stationed on the summit of Mount Washington, New Hampshire. During the evening of the 19th, there was a similar display; this continued all night, but owing to the increased light of the moon, the colors were not so well-defined.

Salt Lake City, Utah: 18th, at 6.08 p. m., an aurora was observed in the north, covering about 90° of the horizon and extending to an altitude of 20°. The mountains north of this city interfered with the observation. The color was reddish and resembled the reflection from an immense fire. A few short streamers appeared, but they remained visible a short time only. The display, which continued until 9.10 p. m., was the first aurora seen here for many years.

Los Angeles, California: 17th, an aurora appeared at 7.10 p. m. as a mass of red light, it resembled the reflection of a large fire, and it moved from a point about 15° east of "Ursa Major" to a point 10° west of the same. At 7.30 p. m., the display was very brilliant. This phenomenon being of unusual occurrence in this latitude, a good deal of alarm was caused among the inhabitants, who supposed that an extensive fire had broken out in the town.

Yuma, Arizona: 17th, a fine auroral display was observed between 6.30 and 7.30 p. m. Beams rose to an altitude of from 20° to 40°, and were of deep red color. The display was confined to the eastern half of the northern sky. The aurora is seldom seen in this latitude.

San Diego, California: 17th, a brilliant aurora was observed here this evening, consisting of columns of light shooting upward from a point a little east of north, to an altitude of 20°. No arch was visible, but the columns blended together forming a cloud of deep red color, which varied in intensity until 7.20 p. m., when it faded from view. This is the first aurora that has been witnessed here since the establishment of the signal office. 20th, a faint aurora, consisting of two luminous beams rising to a height of 20°, was observed at 4.20 a. m. The display lasted till daybreak. At 12.20 p. m., the clouds appeared electrified in an unusual manner. They were of the cirrus class, and were formed in broken lines in a nearly parallel direction from west to east.

Galveston, Texas: 17th, from 10.00 to 11.00 p. m., the sky in the north and northeast became suffused with a brilliant red. This was the first aurora that has been observed at this place since the establishment of the signal office in April, 1871.

Punta Rassa, Florida: 17th, from 11.15 p. m. to midnight, a well-defined auroral display was observed. It was first noticed as a pale luminous light, in the north, of 10° or 12° altitude, resting upon a bank of haze. Later, the light assumed a reddish tinge, gradually deepening in color and extending upward until it presented the appearance of an irregularly shaped dome. This dome waxed and waned both in intensity of color and in dimensions; sometimes it almost faded away, and then reappeared to the westward and eastward of its original position; occasionally, there were two of these domes visible at the same time. A few faint streamers were seen at the beginning of the display, having a slight lateral motion. Throughout the day, the operators of the International Ocean Telegraph company found it difficult to work the cables, connecting this place with Key West, Florida, and Havana, Cuba. The disturbance was felt at the telegraph offices at both Key West and Havana. The effect upon the land lines was not perceptible at this station.

Nashville, Tennessee: 17th, from 1.30 to 4.30 a. m., a brilliant auroral display was observed; it consisted of a deep reddish light in the northern sky. Cloudiness interfered to some extent with the observation. The Saint Louis and Nashville telegraphic circuit was worked without battery, as were also the wires from this city to Lebanon, Tennessee, which are sixty miles apart. 19th, a break in the clouds on the northern horizon, at 9.40 p. m., revealed an aurora of exceptional brilliancy. Numerous beams of 5° to 10° in width were observed, but their altitude could not be determined on account of cloudiness. The sky became totally obscured at 10.30 p. m. Numerous other auroral displays occurred during the month, none of which, however, exhibited and unusual characteristics. They were observed on the following dates: 2d, 5th, 10th to 14th.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

South Atlantic states: 1st, 2d, 22d, 23d.
Florida peninsula: 1st, 2d, 3d, 27th.
East Gulf states: 1st, 2d, 3d, 6th, 12th.
West Gulf states: 1st, 2d, 3d, 5th, 6th, 8th to 12th, 16th, 26th.
Tennessee: 1st, 2d, 9th to 12th.
Ohio valley: 1st, 5th, 8th, 9th, 10th.

Lower lake region: 11th, 24th.
Upper lake region: 10th, 11th.
Upper Mississippi valley: 1st, 4th, 5th, 8th to 11th.
Missouri valley: 1st, 4th, 5th, 7th to 11th, 16th, 25th, 26th.

Thunder-storms were also reported from the following stations, not included in the districts named above: Burlington, Vermont, 11th; Bangor, Maine, 24th; Brackettville, Texas, 26th; Brownsville, Texas, 12th; Cheyenne, Wyoming, 10th, 11th, 15th, 16th; Fort Supply, Indian Territory, 8th, 10th; West Las Animas, Colorado, 10th; Coleman City, Texas, 16th; Fort Davis, Texas, 15th, 16th; Fort Cummings, New Mexico, 7th, 8th; Santa Fé, New Mexico, 8th, 9th; Wellington, Kansas, 8th, 11th; Yates Centre, Kansas, 1st, 4th, 7th to 10th; Pretty Prairie, Kansas, 8th, 10th; Orono, Maine, 24th; Johnsontown, Virginia, 1st.

During thunder-storms, the following instances of damage by lightning have occurred:

Buffalo, New York, 11th: An entensive malt house at Black Rock, was struck by lightning and damaged.

Ironton, Missouri, 10th: A tramp who had taken shelter under under a sand-shed in Arcadia, was injured by lightning; his coat-tail was torn into shreds and his trowsers were ripped to the bottom. A large red mark was left on his thigh, and a red streak down his leg.

Lewiston, Maine, 24th: During a hail storm on the afternoon of this date, a barn in Webster county, containing hay, was struck by lightning and set on fire.

Humboldt, Iowa, 11th: A span of horses were struck by lightning, eight miles south of station.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts, on the following dates:

New Egnland: 3d, 7th, 20th, 21st, 25th, 26th, 28th.
Middle Atlantic States: 9th, 15th, 21st, 26th, 27th, 28th.
South Atlantic States: 12th, 13th, 19th, 20th, 25th, 27th.
East Gulf States: 5th, 6th, 9th, 16th, 17th, 18th, 22d, 23d.
West Gulf States: 14th, 18th, 21st, 22d, 23d.
Ohio Valley and Tennessee: 5th, 8th, 9th, 11th, 16th, 18th, 19th, 20th, 22d to 25th, 27th, 30th.
Upper Mississippi Valley: 4th, 8th, 15th, 24th, 27th to 29th.
Missouri Valley: 4th, 7th, 8th, 9th, 11th, 13th, 15th, 21st, 23d, 24th, 26th, 30th.

Solar halos were also reported from the following stations, not included in the districts named above: Manitowoc, Wisconsin, 8th; Alpena, Michigan, 1st; New Riegal, Ohio, 15th; Detroit, Michigan, 25th; Toledo, Ohio, 5th; Prescott, Arizona, 21st, 23d; Salt Lake City, Utah, 2d, 23d, 29th, 30th; Colfax, Washington Territory, 8th; Lewiston, Idaho, 2d, 28th; Albany, Oregon, 6th, 7th; San Diego, California, 2d, 3d, 12th; San Francisco, California, 6th, 11th, 14th, 22d, 27th; Carson City, Nevada, 6th, 22d, 25th.

A very remarkable solar halo was observed at 10.00 a. m. of the 7th, on board the s. s. "Ptolemy," in latitude N. 19° 51′, longitude W. 37° 21′. The phenomenon preceded a period of tempestuous weather and contrary winds.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England: 20th to 23d, 25th to 28th.
Middle Atlantic states: 16th, 18th to 25th, 28th.
South Atlantic states: 19th, 22d, 23d, 27th.
East Gulf states: 2d, 18th, 21st to 24th.
West Gulf states: 15th, 17th, 20th to 24th.
Rio Grande valley: 14th, 22d, 23d.
Ohio valley and Tennessee: 17th to 21st, 23d to 29th.
Lower lake region: 3d, 24th to 28th.
Upper lake region: 17th, 19th, 20th, 23d, 25th, 29th, 30th.
Extreme northwest: 8th, 21st, 22d, 24th, 29th.
Upper Mississippi valley: 15th, 20th, 21st, 22d, 24th to 28th, 30th.
Missouri valley: 1st, 3d, 18th to 27th, 30th.
Northern slope: 17th, 18th, 20th, 25th, 26th, 28th.
Southern plateau: 3d, 5th, 20th to 23d, 26th, 28th, 30th.
Middle plateau: 2d, 7th, 19th, 23d, 25th, 26th, 28th, 29th, 30th.
Northern plateau: 1st, 17th, 20th to 22d, 24th, 26th to 28th.
North Pacific coast region: 18th, 19th, 22d to 24th, 26th, 27th, 29th.
California: 1st, 5th, 18th, 22d to 25th, 28th.

Lunar halos were also reported from the following stations, not included in the districts named above:

Cedar Keys, Florida, 17th.
Punta Rassa, Florida, 29th.
North Platte, Nebraska, 26th.
Clay Centre, Kansas, 21st, 26th.
Pretty Prairie, Kansas, 24th.
Wellington, Kansas, 23d.
Yates Centre, Kansas, 21st, 26th.
Fort Concho, Texas, 6th, 30th.
Coleman City, Texas, 22d.

MIRAGE.

Northport, Michigan: 1st, a mirage was observed here on this date from 9.00 a. m. to 3.30 p. m.; it showed the beach on the opposite side of Traverse Bay so plainly that cattle were seen walking along the shore of Antrim county. The distance across the bay at this place is twelve miles.

Cape Lookout, North Carolina, 23d.
Indianola, Texas, 14th, 20th, 27th to 30th.
Rapid City, Dakota, 29th.
Salina, Kansas, 6th.
Pretty Prairie, Kansas, 6th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky, as indicative of fair or foul weather for the twenty-four hours succeeding each observation taken at sunset, have been noted at all Signal Service stations. Reports from one hundred and ninety-one stations show 5,696 observations to have been made, of which forty-two were reported doubtful; of the remainder, 5,654, there were 4,869 or 86.3 per cent., followed by the expected weather.

SUN SPOTS.

The following record of observations has been forwarded by Mr. A. S. Bender, of Sacramento, California:

DATE—Nov., 1882.	No. of new		Disappeared by rotation		Reappeared by rotation.		Total No. of		Remarks.
	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	Gr'ps	Spots	
3, 4 p. m...	1	1	1	1	.....	.....	6	20†	New group came in by rotation but not reappeared.
4, 4 p. m...	1	10	.....	.....	.....	10	7	40†	
5, 4 p. m...	.....	10	2	15†	.....	.....	5	30†	
10, 4 p m...	1	1	3	20†	.....	.....	2	10†	Some spots very faint.
11, 4 p. m...	1	1	.....	.....	.....	.....	3	10†	
13, 4 p. m...	1	10	.....	.....	.....	.....	4	20†	One spot in new group very large.
14, 4 p. m...	1	1	1	1	.....	.....	4	20†	
15, 4 p. m...	.....	...	1	10†	.....	.....	3	10†	Group of 13th seems now to be four large spots.
16, 4.15 p.m		.....	.....	.....	1	1	4	20†	Number of spots in large group increased.
17, 4.00 p.m	1	2	1	1	.....	.....	4	15†	Number of spots in large group changing; two very large.
18, 2.45 p.m	.....	.....	.....	.....	.....	.....	4	10†	Number of spots in large group changing; five very large. The large group visible as one spot to naked eye.
19, 4 p. m...	.....	.....	.....	.....	1	3	5	15†	
20, 4 p. m...	.....	.....	2	5	.....	.....	3	10†	
22, 4 p. m...	2	5	.....	.....	.....	.....	5	15†	New group came in by rotation but not reappeared.
23, 3 p. m...	1	1	.....	.....	.....	.....	6	15†	Do.
26, 3 p. m...	.....	10	.....	.....	.....	.....	6	25†	Number of spots increased.
27, 1.30 p.m	1	1	.....	.....	.....	.....	7	45†	A large number of new spots visible in groups already noted.
29, 2.45 p.m	.....	.....	.....	.....	.....	.....	7	60	Do.
30, 4 p m...	.....	.....	.....	.....	.....	.....	.....	.....	Atmosphere very hazy.

† Estimated.